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# Environmental uncertainty accompanying purchases in the B2B market

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**Abstract**

The main aim of the research was to identify the environmental uncertainties accompanying purchasing in terms of different industries and the scope of supply chain. A two-phase methodology design based on the literature review and post survey was used. Gathered data show that enterprises recognize the same types of purchasing uncertainty in general but companies manufacturing or distributing metal products identify them more often than respondents from other industries. Furthermore, the research results confirm that in comparison with the national market, the international market is affected by this type of uncertainty in a greater extent.

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*Keywords:* Uncertainty; Purchases; Supply chain; Flexibility.

## Introduction

Supplier relationship management is a key business process determining competitive advantage of the supply chains (Croxton et al 2001). In recent years, the strategic role of purchases has risen. Mainly that is why, the researches on the efficiency and effectiveness of the purchasing are necessary. The more that this business area is extremely prone to the uncertainty. This showed a recent history and the situations like global financial crisis, the earthquake in Japan and its consequences for the automotive sector (Brennan, 2011) or heavy rains in Thailand and soaring prices of hard drives (Hardy, 2012). What is extremely important, the costs of raw materials and components can extend to 70-80% of product costs (Ghodsypour and O'Brien 2001). Additionally, unforeseen costs of

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uncertainty (e.g. delays, production breakdowns) increase this percentage what can cause catastrophic losses for the supply chain.

The literature provides a high number of papers on the disruptions that affect purchasing in the company and subsequently its value chain (Sheffi, 2001, Chopra and Man Mohan, 2004, Jüttner, 2005,Tang, 2006, Brennan, 2011, Hardy, 2012). Many authors underline that the size of supply chain risk and uncertainty rises and present the sources and effects of supply chain risk and uncertainty (Van der Vorst and Beulens, 2002, Peck, 2006, Sun, Hsu and Hwang 2009, Fayezi, Zutshi and O'Loughlin, 2014, Vilko, Ritala and Edelmann, 2014). A smaller number of authors research the uncertainty in relationships with suppliers in terms of its main dimensions (Baramichai, Zimmers and Marangos, 2007, Mendonça Tachizawa and Giménez Thomsen, 2007, Wu, 2009). Some of them directly refer to the strategies that support dealing with supply uncertainties (Christopher, 2000, Lee, 2002, Zsidisin and Ellram, 2003, Manuj and Mentzer, 2008, Chu, Chang and Huang 2012).

This paper contributes to the enrichment of knowledge in the field of management science. The research fills a gap by identifying the uncertainties in purchasing in terms of different industries. It was aimed at answering three following questions: what are the most common environmental uncertainties accompanying purchasing in the B2B market? Do companies that operate in different industries identify different uncertainties? Are the international supply chains exposed to uncertainty in purchasing in a greater extent than the national supply chains?

Two-phase methodology design based on the literature review and post survey was used. The literature is a source of the knowledge about the supply uncertainty whereas the pilot research provides the findings based on surveyed companies from the various industries in Poland. Additionally, the article draws attention to the possibility of a dealing with the uncertainty accompanying purchases, what is critical for the sustainable and long term growth of current and future companies.

## 1. Supply uncertainty and flexibility

Uncertainty is a source of both risk and opportunity (COSO, 2004, p. 1). It refers to the situation when the company does not have sufficient knowledge to predict all potential scenarios resulting from decisions or operations (Svensson 2002). According to the ISO Guide 73, risk is an "effect of uncertainty on objectives". Analyzing the literature and the authors approaches, it can be noted that sources and the effects of both risk and uncertainty are understood very similarly, particularly referring to the supply chain management (Braithwaite 2003; Zsidisin and Ellram, 2003, Mendonça Tachizawa and Giménez Thomsen, 2007, Fayezi, Zutshi and O'Loughlin 2014).

The uncertainty accompanying purchases in the B2B market can be divided into:

- Uncertainty related to the supply – volume, mix, delivery uncertainties.
- Uncertainty of purchase situation – refers to the number of suppliers in the market, supplier-buyer dependences, type of purchased items.
- Uncertainty of macro environment – refers to the unpredictable changes of macro environment factors.
- Uncertainty in the process of purchasing – connected with the decisions and operations. It refers to each phase of this process e.g. uncertainty related to the correctness of description of purchase need, used methods, techniques and criteria of supplier assessment, decisions on supplier selection and the directions of the development the cooperation, correctness of sent orders, quality and punctuality of supplies.

In recent years the supply chain flexibility concept has been developed. Its roots are in supply chain agility. Flexibility is an element of agility (Lin, Chiu and Chu, 2006). It is "a key characteristic of an agile organization" (Christopher 2000), the basic concept of agility (Fan et al. 2007) and one of four agile supply chain capabilities: responsiveness, competency, flexibility, quickness (Lin, Chiu and Chu 2006).

Supply chain flexibility aims at dealing with the environmental uncertainty (Duclos, Vokurka i Lummus 2003, 2005, Soon and Udin 2011). It is defined as "the ability of an organization to manage the internal (e.g. manufacturing) and interfacing (e.g. procurement and distribution) processes, as well as its key suppliers/customers to respond to expected changes in supply, product and demand in an efficient manner enabled by both technological and social platforms" (Fayezi, Zutshi i O'Loughlin 2014).

Supply flexibility is one of few dimensions of supply chain flexibility. It supports dealing with supply uncertainty accompanying purchasing, increases resilience and adaptability of relationship with suppliers. In particular, it refers to the ability to change the supply time of delivery, volume and product variety as well as to introduce new products fast (Leslie et al, 2003). It is also the supplier's ability to deal with the short product life cycle times, production of small quantities at lower costs or large amounts in a short time.

There are two main approaches to minimize supply uncertainty: behavior based management and buffer oriented management (Zsidisin and Ellram, 2003). The former refers to the development of the relationship with suppliers using such tools as supplier assessment, certification, development, involving suppliers in product and process design. The latter is a traditional way of dealing with uncertainties and means multiple sourcing, keeping buffers of production capacity, safety stocks or holding inventory by suppliers.

## Methodology

The research concerned the uncertainty that occurs in purchases in the B2B market. The post survey was performed at the end of 2013. The paper-and-pencil option was chosen. The research covered the production and distribution companies operating in Poland. The Internet Polish database HBI (http://www.hbi.pl) provided with data of respondents. It was assumed that respondents should know the role of purchases in gaining the customer satisfaction. That is why, the main selection criterion of the researched group was having ISO 9001 certificate by the respondent. ISO 9001 clearly refers to the purchasing process (point 7.4 of the standard). As a result, companies commit to ensure that the supplies will meet their requirements. This all guarantees that the respondents have the knowledge of the research subject. Out of the total of 3,857 sent questionnaires and 182 properly fulfilled, unique and usable responses were included in the analysis. Although the structure of the questionnaire was simple, the return rate was 4.71%. Unfortunately, this size of rate can be a limitation influencing the credibility of research results. However, the research had a character of the pilot one. The companies could mark a free number of standardized items placed under asked question "What are the uncertainties that accompany purchases in your company?". The percentage of each variable was calculated. The variables used in the research were developed on the base of the literature (Kraljic, 1983, Nellore and Söderquist, 2000, Slack, 2005, Mendonça Tachizawa and Giménez Thomsen, 2007). The subject of the survey were also the strategies performed by the companies to ensure the flexibility in terms of uncertainty coming from the environment.

The following segments of manufacturing and distributing companies were distinguished:

- Companies manufacturing electromechanical products;
- Companies manufacturing metal products;
- Companies manufacturing chemical products;
- Companies manufacturing food products;
- Companies manufacturing construction products;
- Companies distributing electromechanical products;
- Companies distributing metal products;
- Companies distributing chemical products;
- Companies distributing food products;
- Companies distributing construction products.

Additionally, other data: spatial range (national or international) and market in which the products are being offered (domestic or domestic and foreign) allowed to compare the segments of companies operating in the national and international supply chains.

## 2. Findings

Research data shows, that both, production and distribution companies identify many uncertainties accompanying purchases. The environmental pressure to reduce costs and to look for cheaper sources of supply is in the first place (78,45%). In the face of demanding clients and global competition, the pressure to reduce prices of products are extremely important challenge for supply chain managers. Purchasing costs may constitute a large part of the product cost (Quayle 2002). Mainly that is why, supply chain integration begins with reducing purchasing costs and changes in supply base (Poirier and Quinn, 2004). Additionally, vast majority of surveyed enterprises (69.61%) identify a high value of purchases as a source of uncertainty. According to the portfolio models, it is characteristic of the cooperation with suppliers of strategic items (Kraljic, 1983, Ellram and Olsen, 1997).

Unfortunately, macro environment changes are the uncertainties that organization cannot influence. The effective way of dealing with them is building agile systems (Lin, Chiu and Chu, 2006). Probably that is why, both fluctuations in commodity prices and currency fluctuations pose a serious threat for the respondents. They are egzequo in second place (72.38%) while changes in legislation are pointed by 64.09% of the companies.

Macro environment factors are extremely severe especially in the international markets. Interestingly, changes in commodity prices, changes in legislation and currency fluctuations were identified in the study from 2009 performed by the author of this paper, by a similar group of respondents, as the most common factors taken into account during the analysis of environmental risks. It means that still these are the main challenges for the companies. Ability to adapt to change is, for 95% respondents of the global survey conducted by Pricewaterhouse Coopers in (2009, p. 24), an important or critical source of competitive advantage in sustaining growth over the long term.

Product flexibility is a key dimension of the competitive supply chains, especially for manufacturing flexibility (Slack, 2005). However, technological changes and shortening product life cycle are in the last places in the survey, but still half of the respondents point them.

According to the respondents, the balance of power in supplier-buyer relationship is an often uncertainty in purchasing. In third place companies point: a small number of suppliers in the market (70.72%) as well as negotiating advantage of suppliers (70.72%). A large number of indications also relates to the lack of substitutes for purchased components (65.19%). These uncertainties occur especially in cooperation with "bottlenecks" suppliers. This type of cooperation is very difficult to manage according to the portfolio models (Kraljic, 1983; Ellram and Olsen, 1997).

Over 60% of respondents have to deal with a technological dependence on the supplier. On the other hand, over half of researched companies identify uncertainty for the cooperation with suppliers with a low level of development (54.14%). Technological dependence is the greatest for "black box" situation - when the supplier develops project of the product basing on the general specification from the client (Handfield and Lawson 2007). However, Nellore and Söderquist (2000) underline that joint product development is necessary when the company buys critical items.

Mix, volume and delivery uncertainties are in the sixth place among the answers pointed by respondents (69.61%). They are typical for the cooperation with suppliers (Mendonça Tachizawa and Giménez Thomsen, 2007), whereas supply uncertainty is one of the four main types of uncertainties for supply chains (Fayezi, Zutshi and O'Loughlin 2014). The high percentage of indications of supply uncertainty in the survey means, that today the dynamism of demand is high.

62.43% of surveyed enterprises notice the uncertainty in the situation when the complexity of offered product/product diversity is high and thus there is a need for cooperation with a large number of suppliers. Building the strong supply base and a long term cooperation in face of this challenge is certainly costly and difficult. The more that the half of the respondents (53.59%) identify lack of involvement of suppliers in improving/developing relationship with them.

Comparing segments, it can be seen that the manufacturing companies identify the uncertainties accompanying purchases more often than distributing companies. This can result from the complexity of relationships with suppliers. Manufacturers are more focused on adding the value to the products, product development and supply base improvement. Among the manufacturing companies, the largest percentage of indications refer to companies manufacturing metal products and the smallest - chemical products. When it comes to the segments of the distribution companies, the situation is very similar. The largest percentage of indications refer to the companies

distributing metal products. The smallest - chemicals and food. It means that today, market of metal products is the most volatile one in terms of supply, demand and product whereas the market of chemicals and food - the less.

It is worth of noting that companies operating in the supply chain of construction products identify the uncertainty coming from macro environment the most often. The uncertainty arising from the purchasing situation (supplier-buyer relationship) is recognized the most often by the companies operating in the supply chains of metal products.

Companies offering products in both domestic and foreign market identify all types of uncertainty more often than companies selling product only in the domestic market. In terms of the scope of the supply chain in which the respondent operates, companies with an international spatial range have to deal with the uncertainties more often than companies with national spatial range. However, there are two exceptions. The reverse situation applies to the variables: a small number of suppliers in the market and technological dependence on suppliers. It means, that the domestic market brings the uncertainty connected with the supplier monopoly more often.

## Conclusions

The study presents that the most common uncertainties accompanying purchases come from macro environment. At the next place the uncertainties connected with changes in supplies (mix, volume, time) arise and then these resulting from buying situation (e. g. bargaining power, dependency). It confirms the fact, that the uncertainty of the macro environment is extremely difficult to minimize. In contrast, companies have a higher influence on the supply base. For instance by performing supplier assessment, selection, certification, improvement or early involvement partners in product development. This provides the information to the managers, that they should concentrate at the supplier relationship improvement and building the partnership at first, if they want to minimize the negative impact of the uncertainty effectively.

Further, manufacturing companies identify the uncertainties accompanying purchases more often than distributing companies. It results from the fact, that the complexity of relationship with suppliers is higher in case of manufacturing than distributing companies. This should encourage manufacturing companies to a particular concentration on supply base development.

It should be underlined that each variable placed in the survey was pointed by at least half of the respondents. This confirms the importance and the presence of the researched issues in a business practice nowadays. It means that the research on purchasing uncertainty is crucial for building competitive supply chains.

The largest percentage of indications refer to the companies that manufacture metal products and the smallest – chemical products. When it comes to the segments of the distribution companies, the situation is very similar. This is an important information about the size of the uncertainties in particular industries for e.g. managers starting up or developing their business.

The research proves that international market is more turbulent than national one in terms of purchasing. That is why companies that are the links in international supply chains should principally improve they relationship with suppliers.

The survey results show that the environmental uncertainty affects purchases of the companies from different industries in a different degree. This can be explained by the fact, that different supply chains are determined by different factors such as: product variety, demand predictability or variety of volume production. This points the next directions of the research. The dependences between supply chain attributes/strategies e.g. continuous replenishment, lean, agile (Gattorna and others, pp. 48-52) and purchasing uncertainties should be identified. The activities/techniques minimizing uncertainties performed by particular companies are also interesting.

Summing up, the article informs supply chain managers what is the uncertainty and why dealing with it is so important today. The first step of the effective uncertainty management is the uncertainty identification. The paper brings companies from different industries the answer what types of uncertainty accompanying purchases they should identify and which of them try to influence as first.

There are some limitations on the empirical research. One of them is the low rate of return. Although survey results are derived from a pilot study, the article can support decisions accompanied by the environmental uncertainty in purchasing.

## References


Baramichai M., Zimmers Jr E.W., Marangos, Ch. A. (2007). Agile supply chain transformation matrix: an integrated tool for creating an agile enterprise. Supply Chain Management: An International Journal, 12, 334 – 348.

Braithwaite A., (2003). The Supply Chain Risks of Global Sourcing, Supply Chain Strategy and Trends - Globalization, LCP Consulting.

Brennan P. (2011). Lessons learned from the Japan Earthquake. Disaster Recovery Journal, 24, 22-26.

Chopra, S., Man Mohan, S. S., (2004). Managing Risk to Avoid Supply-Chain Breakdown, MIT Sloan Management Review. 46, 53-62.

Christopher, M. (2000). The agile supply chain: competing in volatile markets. Industrial Marketing Management, 29, 37-44.

Croxton, K. L., García-Dastugue, S. J., Lambert, D. M., Rogers, D. S. (2001). The Supply Chain Management Processes.International Journal of Logistics Management. 2001, 12, 13-36.

Duclos L. K., Vokurka R. J., Lummus R. R., (2003). A conceptual model of supply chain flexibility. Industrial Management & Data Systems, 103, 446-456.

Duclos L. K., Vokurka R. J., Lummus R. R., (2005). Delphi study on supply chain flexibility. International Journal of Production Research, 43, 2687-2708

Ellram L. M., Olsen R. F., (1997). A portfolio approach to supplier relationships. Industrial Marketing Management, Vol. 26, No. 2, pp. 101–113.

Fan, Q., Xu, X.J., and Gong, Z.Y., 2007, "Research on lean, agile and Leagile supply chain", 2007 international conference on wireless communications, networking and mobile computing, 21–25 September, Shanghai, China. New York: IEEE, vols 1–15, 4902–4905.

Fayezi S., Zutshi A., O'Loughlin A., (2014). Developing an analytical framework to assess the uncertainty and flexibility mismatches across the supply chain. Business Process Management Journal, 20, 362 – 391.

Gattorna J. and friends, 2009. Dynamic Supply Chain Alignment. Gower Publishing Limited, MPG Books Group.

Ghodsypour, S.H., O'Brien, C., (2001). The total cost of logistics in supplier selection, under conditions of multiple sourcing, multiple criteria and capacity constraint, "International Journal of Production Economics", 73, 15-27.

Handfield R. B., Lawson B., (2007). Integrating Suppliers Into New Product Development. Research-Technology Management, 50, 44-51.

Hardy L., 2012, "Hard-Working Drives: How Floods in Thailand Affect Us All", http://www.bbc.co.uk/news/business-17567635 (accessed 10 October 2013).

ISO/IEC Guide 73:2002, (2002). Risk Management – Vocabulary – Guidelines for Use in Standards. International Organization for Standardization, Geneva.

Jüttner, U., (2005).Supply chain risk management: Understanding the business requirements from a practitioner perspective. The International Journal of Logistics Management, 1,120 – 141.

Kraljic, P. (1983). Purchasing must become supply management. Harvard Business Review, September/October, 61,109–117.

Lee, H.L. (2002). Aligning supply chain strategies with product uncertainties. California Management Review, 44, 105-19.

Lin, C.T., Chiu, H., and Chu, P.Y., (2006). Agility index in the supply chain. International Journal of Production Economics, 100, 285–299.

Manuj, I. and Mentzer, J.T., (2008). Global supply chain risk management strategies. International Journal of Physical Distribution & Logistics Management, 38,192–223.

Mendonça Tachizawa, E., Giménez Thomsen, (2007). Drivers and sources of supply flexibility: an exploratory study, International Journal of Operations & Production Management, 27, 1115-1136.

Nellore R., Söderquist K., (2000).Portfolio approaches to procurement: Analyzing the Missing Link to Specifications. Long Range Planning, 33, 245-267.

Peck, H. (2006). Reconciling supply chain vulnerability, risk and supply chain management. International Journal of Logistics: Research & Applications, 9,127–142.

Poirier, Ch. C., Quinn, F. J. (2004). How are we doing - A survey of supply chain progress. Supply Chain Management Review, 8, 24-31.

Pricewaterhouse Coopers (2009). 12th Annual Global CEO Survey.

Quayle, M., (2002). Supplier development and supply chain management in small and medium size enterprises. International Journal of Technology Management, 23, 172-188.

Sheffi, Y., (2001). Supply Chain Management under the threat of International Terrorism, International Journal of Logistics Management,12, 1-11.

Slack N., (2005). The flexibility of manufacturing systems. International Journal of Operations & Production Management, 2, 1190 – 1200.

Soon Q.H., Udin Z.M.,(2011). Supply chain management from the perspective of value chain flexibility: an exploratory study. Journal of Manufacturing Technology Management, 22, 506-526.

Sun, Szu-Yuan, Hsu Meng-Hsiang, Hwang Wen-Jin, (2009). The impact of alignment between supply chain strategy and environmental uncertainty on SCM performance. Supply Chain Management: An International Journal, 14, 201 – 212.

Svensson G., (2002). A conceptual framework of vulnerability in firms' inbound and outbound logistics flows. International Journal of Physical Distribution & Logistics Management, 32, 110 – 134.

Tang, Ch. S., (2006). Robust strategies for mitigating supply chain disruptions, International Journal of Logistics: Research and Applications, 9, 33-45.

Van der Vorst, J., Beulens, A. (2002). Identifying source of uncertainty to generate supply chain redesign strategies. International Journal of Physical Distribution & Logistics Management, 36, 409-30.

Vilko, J., Ritala P., Edelmann, J.,(2014). On uncertainty in supply chain risk management. The International Journal of Logistics Management, 25, 3 – 19.

Wu, Liang-Chuan, (2009). Supplier selection under uncertainty: a switching options perspective. Industrial Management & Data Systems, 109, 191 – 205.
Zsidisin, G.A., Ellram, L.M. (2003). An agency theory investigation of supply risk management. Journal of Supply Chain Management, 39, 15-27.